

KAPLUNOV, D.R.; KIRICHENKO, G.S.

Basic problems in developing an underground mining system with
mass caving as exemplified by Krivoy Rog Basin mines. Nauch.
soob. IGD 12:11-23 '61. (MIRA 15:9)
(Krivoy Rog Basin--Mining engineering)

BURTSEV, L.I.; KAPLUNOV, D.R.

Study of the efficiency of large-scale ore blasting in a compressed medium. Gor. zhur. no.2:34-38 F'62. (MIRA 17:2)

1. Institut gornogo dela im. Skochinskogo, Moskva.

KAPLUNOV, D.R., kand. tekhn. nauk; IONOV, A.N., gornyy inzh.

Relation between the structural features of the massif and the
results of crushing by blasting. Vzryv. delo no.53/10:17-23 '63.
(MIRA 16:8)

1. Institut gornogo dela im. A.A. Skochinskogo.
(Joins (Geology) (Blasting)

KAPLUNOV, D.R., kand.tekhn.nauk

French-Russian mining dictionary; compiled by L.I. Baron and N.N.
Ershov. Gor.zhur. no.12:70 D '64. (MIRA 18:1)

1. Institut gornogo dela im. A.A.Skochinskogo.

SERGIYEVSKAYA, Ye.N., kand.tekhn.nauk; KAPLUNOV, I.B., inzh.

Structure and information and control means of the EAUS-u electronic system. Teploenergetika 10 no.6:86-89 Je '63. (MIRA 16:7)

1. Vsesoyuznyy teplotekhnicheskii institut.
(Electric controllers) (Automatic control)

AGEYKIN, Dmitriy Ivanovich; KAPLUNOV, I.B., red.; LARIONOV, G.Ye.,
tekhn. red.

[Magnetic gas analyzers] Magnitnye gazoanalizatory. Moskva,
Gosenergoizdat, 1963. 215 p. (MIRA 16:5)
(Gases--Analysis) (Magnetic instruments)

VARDENBURG, A.K., kand.tekhn.ruak; AYZENBERG, B.L., inzh.; KAPLUNOV,
I.Ya., inzh.

Styrene compounds. Vent.elektroprom. 33 no.12:14-16 D '62.

(MIRA 15:12)

(Styren)

KAFUNOV, I.Ya., inzh.

Review of V.V. Baranovskii and IA. L. Shagal's book "Laminar
plastics for electrical engineering applications". Elektro-
tehnika 35 no.10:p.3 of cover 0 '64.

(MIRA 17:11)

L 39714-66 EWP(j)/EnI(m)/I IJP(c) RM/GD-2

ACC NR: AP6007962

(A)

SOURCE CODE: UR/0191/66/000/003/0005/0007

AUTHOR: Berlin, A. A.; Kaplunov, I. Ya.; Barninov, V. A.

ORG: none

TITLE: Compatibility of polyvinyl chloride with oligo-ester-acrylates and some properties of their products

SOURCE: Plasticheskiye massy, no. 3, 1966, 5-7

TOPIC TAGS: polyvinyl chloride, acrylic plastic, polymerization, oligomer, solid physical property, electric property

ABSTRACT: A study was made to obtain the optimal formulation of the polymer-oligomer systems (clathrate polymers) having the best physicochemical properties. Using different weight ratios of the reagents, polyvinyl chloride (PVC) and a polymerizable oligomer were polymerized at 125C for 2 hr. The compatibility of the reagents was determined by a nephelometric study of films of the polymers produced. Linear oligomers TGM-3, MGF-9, and MBF-1 and short-chain organosilicon DEMFS-2m were mixable with PVC at a wide range of concentrations. Branched oligomers 7-1 and 7-20 could be mixed at low concentration. Clear films were obtained with 30-40% 7-1 or 7-20. The polymers obtained hardened at 140-145C and had a higher liquidus temperature than PVC (due to the cross-linked bonds formed). Their thermal stability was 40-45C higher and their electrical properties were better than those of PVC. When extracted with

Card 1/2

UDC: 678.743.22+678.674

L 39714-66

ACC NR: AP6007962

dichloroethane, 80% of the polymer was insoluble and contained 30% bonded PVC. It proved that only a part of PVC became chemically bonded and that the rest of it remained as a matrix structure. Orig. art. has: 5 fig.

SUB CODE: 07/ SUBM DATE: none/ ORIG REF: 006/ OTH REF: 006

Card 2/2 *gd*

1.2.
KAPLUNOV, starshiy nauchnyy sotrudnik.

New coal mining techniques in inclined seams. Mast.ugi. 2 no.10:7-8 0 '53.
(MLRA 6:10)

1. DonUGI.

(Coal mines and mining)

KAPLUNOV, I. Z

Fuel Abstracts
May 1954
Natural Solid
Fuels: Winning

3358. OPERATION OF DOMELESS CUTTER-LOADERS ON DIPPING SEAMS IN COMBINATION WITH DON UOI SINGLE FLANGE PLATES. / Kaplunov, I. Z, and Yatskikh, V. G. (Ugol (Coal) Dec. 1953, 39-42). An illustrated description is given of a cutter-loader working in a seam which dips at 28-30°. A series of overlapping steel plates on the floor, each with a vertical flange at the edge opposite to the coal face, forms a conveying trough between the last row of props and the face for the supply of new timber from the top and the discharge of cut coal to the bottom of the slope. (L).

KAPLUNOV, IVAN ZAKHAROVICH

SHUMILOV, Vasil'y Vasil'yevich; KAPLUNOV, Ivan Zakharovich; TARASENKO, Viktor Ivanovich; LATAUZOY, Aleksandr Grigor'yevich; APOHINA, G., redaktor; VUYEK, M., tekhnicheskij redaktor

[Work of the ShBM-1 combine in mines of the Donets Basin] Rabota kombinov ShBM-1 na shakhtakh Dombassa. Kiev, Gos.izd-vo tekhn. lit-ry USSR, 1955. 90 p. (MLRA 9:3)
(Donets Basin--Coal mines and mining)

YATSKIKH, Valerian Grigor'yevich, kand. tekhn.nauk; SKAFA, Boris
Filippovich, kand.tekhn.nauk; KAPLUNOV, Ivan Zakharovich,
insh.; CHERNEGOV, A.A., insh., ~~Fetsensent~~; SEMENENKO,
M.D., insh., red.isd-va; SHAFETA, S.M., tekhn. red.

[Mechanization of mining pitching coal seams] Mekhaniza-
tsiia vyemki krutopadaiushchikh ugol'nykh plastov. Kiev,
Gos.isd-vo tekhn.lit-ry USSR, 1963. 201 p. (MIRA 16:8)
(Coal mining machinery)

KAPLUNOV, M.

Symposium on the Radiochemistry of Polymers. Atom. energ. 18 no.3:
304-305 Mr '65. (MIRA 18:3)

S/106/63/000/004/003/008
A055/A126

AUTHOR: Kaplunov, M.B.

TITLE: On the calculation of shielded transmission lines for surface radio-waves

PERIODICAL: Elektrosvyaz', no. 4, 1963, 20 - 27

TEXT: Formulae are given that permit simplifying considerably the calculation of the basic parameters of the shielded coaxial lines for transmission of type E_{00} -surface waves, already examined by the author [Sbornik trudov NII Ministerstva svyazi SSSR, 1962, no. 1 (25)] and by Ioshida (Toshiba Rev., 1956, v. 11, no. 7). The underlying parameter is the transverse wave number γ_3 in air (medium 3 in Fig. 1). The formulae for the calculation of the lines could already be simplified in the author's earlier work thanks to the introduction of the characteristic impedance

$$Z_0 = \frac{2N}{1_z^2}, \quad (6)$$

Card 1/4

On the calculation of shielded transmission

S/106/63/000/004/003/008
A055/A126

where \bar{N} is the average power transmitted along the line and I_z is the current amplitude in the central conductor. However, the expression giving Z_0 remained rather cumbersome (this expression is reproduced in an appendix to the article, together with the other formulae obtained in the author's earlier work and in Ioshida's work). For the case of a sufficiently thin layer, of small transverse dimensions of the central conductor and of a small relative permittivity, this expression can be simplified and brought to the following form:

$$Z_0 \approx \frac{15}{\pi} h \lambda \zeta_3, \quad (7)$$

where h is the longitudinal wave number, λ is the wavelength in unbounded vacuum and

$$\zeta_3 = \left(\frac{d}{b}\right)^2 \left[\frac{Z_1 (\gamma_3' d, \gamma_3' d)}{Z_1 (\gamma_3' d, \gamma_3' b)} \right]^2 + \left[\frac{Z_0 (\gamma_3' d, \gamma_3' b)}{Z_1 (\gamma_3' d, \gamma_3' b)} \right]^2 + \frac{2}{\gamma_3' b} \frac{Z_0 (\gamma_3' d, \gamma_3' b)}{Z_1 (\gamma_3' d, \gamma_3' b)} - 1.$$

The quantity ζ_3 can be obtained from a graph reproduced in the article. The author derives also a simplified formula for the group velocity. This formula is

Card 2/4

On the calculation of shielded transmission

8/106/63/000/004/003/008
A055/A126

$$v_{gr} = \frac{1}{\frac{1}{v_{ph}} + \frac{2 \overline{W_{el}}(z)}{N}}, \quad (15)$$

where v_{ph} is the phase velocity and $\overline{W_{el}}(z)$ (and also $\overline{W_{el}}(\rho)$) is a part of the "linear" (pogonnaya) electric energy $\overline{W_{el}} = \overline{W_{el}}(\rho) + \overline{W_{el}}(z)$, $\overline{W_{el}}(\rho)$ and $\overline{W_{el}}(z)$ being conditioned by the corresponding components of the field. (The line over N and W stands for "time-averaged".) There are 6 figures.

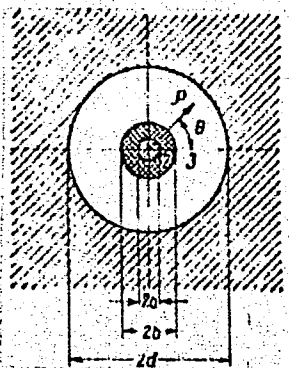
SUBMITTED: July 23, 1962

Card 3/4

On the calculation of shielded transmission

S/106/63/000/004/003/008
A055/A126

Figure 1



Card 4/4

KAPLUNOV M. G.

AID P - 5226

Subject : USSR/Aeronautics - maintenance
Card 1/1 Pub. 135 - 12/26
Author : Kaplunov, M. G., Eng.-Capt.
Title : ~~Prevention of breaks in the parallel operation of~~
generators.
Periodical : Vest. vozd. flota, ³⁹11, 60-63, N 1956
Abstract : The causes of failures in operation of generators and
how to prevent them are discussed by the author.
Institution : None
Submitted : No date

Krasnov, M.M.
 BREMER, G.I., doktor tekhn.nauk, prof.; GARDIN, M.V., inzh.; DEMIN, A.V.,
 kand.tekhn.nauk; ZYABLOV, V.A., kand.tekhn.nauk; KAPLUNOV, M.M.,
 inzh.; KASHBEKOV, L.Ya., inzh.; KOROLEV, V.F., kand.tekhn.nauk;
 KRASNOV, V.S.; KULIK, M.Ye., kand.tekhn.nauk; MAKAROV, A.P., inzh.;
 NOVIKOV, G.I., kand.tekhn.nauk; NOSKOV, B.G., inzh.; OLENEV, V.A.,
 kand.vet.nauk; OSTANKOV, V.P., inzh.; PERCHIKHIN, A.V., inzh.;
 POKHVALENSKIY, V.P., kand.tekhn.nauk; SERAFIMOVICH, L.P., kand.
 tekhn.nauk; SMIRNOV, V.I., kand.tekhn.nauk; URVACHEV, P.N., kand.
 tekhn.nauk; FADEYEV, N.N., inzh.; FATEYEV, Ye.M.; KRYUKOV, V.L.;
 red.; VESKOVA, Ye.I., tekhn.red.

[Reference book on the mechanization of stock farming] Spravochnaia
 kniga po mekhanizatsii zhivotnovodstva. Moskva, Gos.izd-vo sel'khoz.
 lit-ry, 1957. 678 p. (MIRA 10:12)

1. Chlen-korrespondent Vsesoyuznoy akademii sel'skokhozyaystvennykh
 nauk im. V.I.Lenina (for Krasnov, Fateyev).
 (Farm equipment) (Stock and stockbreeding)

KAPLUNOV, M.M.

The BZh-1,7 tractor liquid sprayer. Biul. tekhn.-ekon. inform. no.3:
64-65 '58. (MIRA 11:6)

(Agricultural machinery)

KAPLUNOV, M.M.; TAMARIN, N.M.; SHIPILOV, M.M.

Using machinery in the preparation and application of composts.
Zemledelie 24 no.1:54, 59 Ja '62. (MIRA 15:2)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut udobreniy i
agropochvovedeniya (for Kaplunov, Tamarin). 2. Glavnyy agronom
opytно-pokazatel'nogo sovkhoza "Konstantinovo" (for Shipilov).
(Compost) (Agricultural machinery)

KAPLUNOV, M. [P.7]

AID P - 3475

Subject : USSR/Aeronautics
Card 1/1 Pub. 135 - 10/20
Author : Kaplunov, M., Eng. Capt.
Title : Independent engine starting
Periodical : Vest. voz. flota, 12, 51-52, D 1955
Abstract : The author reports the experience of his unit with the equipment of aircraft with independent starting devices. Trade marks of batteries are given and some names mentioned.
Institution : None
Submitted : No date

KARMINSKIY, D.E., doktor tekhn. nauk, prof.; ~~KAPLINOV, M.P., starshiy~~
prepodavatel'; BOGOSLAVSKIY, Ye.G., kand. tekhn. nauk

Comparing the action exerted on the track by locomotives with
frame- or axle-mounted electric traction motors. Trudy RITZHT
no.44:3-16 '64.

Studying the natural vibrations of VL60 and VL40 electric
locomotives. Ibid.:17-45

(MIRA 19:1)

KAPLUNOV, M.P., inzh.

Stand used for testing ejector models. Trudy RIIZHT no.21:251-266
'58. (MIRA 11:6)

(Locomotives—Exhaust—Testing)

KAPLUNOV, M.

(6)

Chem Abs V4 F
1-25-54
Elastomers

Polymerization phenomena in the vulcanization process.
B. A. ~~Dokuchaev~~, M. F. ~~Pol'dshchein~~, A. ~~Dokuchaeva~~, V. ~~Shkurina~~, and M. Kaplunov (M. V. Lomonosov Fine Chem. Technol. Inst., Moscow), *Doklady Akad. Nauk S.S.S.R.* 92, 61-4 (1933); *Ch. C.A.* 34, 4301; *Khimiya i Fizika Kauchuka* 1947 (C.A. 43, 5824b).—In the complex of forces that comprise the formation of vulcanized rubber, the principal ones are those existing as true chem. bond: formed through the agency of the vulcanizing agents, along with possible true polymerization phenomena induced by free radical formation and resulting in C-C bond formation between the rubber chains. When a rubber mixt. is heated to 143° with either benzothiazolyl disulfide (I) or benzothiazolesulfenodiethylamide (II), vulcanization takes place; the effect is least pronounced with natural rubber; I vulcanizes most effectively Na-butadiene rubber (III); II is most effective with butadiene-styrene rubber. The rate of the reaction of such a mixt. of III contg. lampblack is much greater than the rate with S. Since no free S is evolved, the reaction must proceed by radical formation, which is confirmed by the detd. content of chemically-bound S and N in the final product. With II, approx. 45% of the N enters the rubber structure. Carefully purified II was heated in N in sealed vessels in toluene in the presence of I, labeled with S³⁴ in the disulfide bridge. Typical vulcanization took place. The radioactivity of the vulcanizate was detd. It corresponded to the expected level if the reaction is assumed to proceed by formation of

free radicals of $\text{CH}_2\text{SC(S-)}\text{N}$, which then attack the unsatd. points in the rubber chain, causing a chain polymerization effect. Mercaptobenzothiazole, the expected by-product, was detected. G. M. Kosolapoff

7-13-54

GUR'YANOVA, E.N.; KAPLUNOV, M.Ya.

Synthesis of 2-mercaptobenzothiazole and its derivatives tagged
with sulfur isotope S35. Dokl.AN SSSR 94 no.1:53-56 Ja '54.
(MIRA 7:1)

(Benzothiazole) (Sulfur--Isotopes)

USSR/ Chemistry - Synthetic rubber

Card 1/1 Pub. 22 - 40/56

Authors : Tarasova, Z.; Kaplunov, M.; and Dogadkin, B.

Title : Interchange reactions in vulcanized rubber

Periodical : Dok. AN SSSR 99/5, 819-822, Dec 11, 1954

Abstract : Two types of vulcanized butadiene styrene rubber one of which contained S diphenylguanidine and ZnO and the other - tetramethylthiuramdisulfide and ZnO were investigated to determine the interchange reactions occurring in vulcanized rubber. The method employed in the study of interchange reactions, is described. It was established that the S in polysulfide bond of vulcanized rubber enter into an isotopic exchange with the radioactive whereas S in mono- and disulfide bonds will not submit to interchange. The relative S-content in polysulfide bonds is determined by the interchange intensity of the sulfur bound in the vulcanized rubber. Six references: 4-USSR; 1-USA and 1-English (1944-1954). Table; graphs

Institution: Scientific Research Institute of Tire Industry

Presented by: Academician V. A. Kargin, June 22, 1954

L 3935-66

ACCESSION NR: AP5018258

UR/0108/65/020/007/0015/0025
621.372.2

25
B

AUTHOR: Kaplunov, M. B. (Active member)

TITLE: Bent shielded single-conductor transmission line with a surface wave

SOURCE: Radiotekhnika, v. 20, no. 7, 1965, 15-25

TOPIC TAGS: transmission line

ABSTRACT: Formulas for the coupling factors between the fundamental surface mode E_0 in a single-conductor line surrounded by a perfect-conductor shield and the modes arising at a bend are developed by a method of cross-sections. The bend-caused mixed spurious modes are considered as slightly disturbed electric or magnetic modes of a coaxial waveguide. Curves of the coupling factor vs. dielectric thickness, for different shield sizes, are presented. For certain boundary conditions, the power loss accompanying the transformation into spurious modes at easy and sharp bends, under single-mode conditions, is calculated as a function of the line cross-section dimensions. Orig. art. has: 16 figures and 33 formulas.

Card 1/2

L 3935-66

ACCESSION NR: AP5018258

ASSOCIATION: Nauchno-tehnicheskoye obshchestvo radiotekhniki i elektrosvyazi
(Scientific and Technical Society of Radio Engineering and Electrocommunication)

SUBMITTED: 15Oct63

ENCL: 00

SUB CODE: EC

NO REF SOV: 003

OTHER: 003

Card 2/2 DP.

KAPLUNOV, M. (Ya.)

Theory of vulcanization and the action of accelerators. B. A. Dogadkin, V. Selyukova, Z. Tarasova, A. Dobromysolva, M. Fel'dshteyn, and M. Kaplunov (Inst. Fine Chem. Technol., Moscow). Kolloid Zhur. 17, 215-29(1955); cf. C. A. 48, 1047e. —Na-butadiene rubber (I) was vulcanized by heating at 143° with (e.g., 6%) benzothiazolyl disulfide (II) in toluene in N; e.g., after heating for 9 hrs., the mol. wt. was 300,000 when the initial mol. wt. was 100,000, and the S concn. was 0.4%; about 40% of the initial II was decompd., and about 0.5 the decompd. II was transformed into mercaptobenzothiazole. An analogous vulcanization in the solid state gave, in 6 hrs., a product with elasticity modulus E of 5 kg./sq. cm. The rate of stress relaxation of these vulcanizates was increased by substituting S for a part of II; this showed that, in the reaction between I and II, more stable C—C bonds form, while the reaction between I and S results in less stable —S—S— bonds. The no. of bonds produced by 1 mol. of II attached to I was 1.1—5.4. The mechanism of this bond formation is discussed. Heat-merization of III) with II at 125° caused about 30% polymerization of III. When I was vulcanized with a mixt. of S

Card 2

and II. the rate of reaction increased linearly with the ratio of II to I. The increase of E with the S content of the vulcanizate was greater, the greater the proportion of the 1, 4-isomer in I. The S of the vulcanizate, by using S^{35} was shown to exchange with the S in II or with free S. The reactions of the α -CH₂ group of rubber chains are very important for vulcanization.

J.J. Bikerman

KAPLUNOV, M. Ya.

USSR:

79497. Use of radioactive sulphur for the study and control of the vulcanisation process. Z. N. Terezhova, M. Ya. Kaplunov and B. A. Dogaletskii (Zavod. Lab., 1968, 21-74, 395-397). To determine combined sulphur in rubber during manufacture, a proportion of the ^{35}S isotope is added to the vulcanising agent and the β -radiation intensity of discs 20 mm in diameter (0.3 mm thick for soft rubber) is measured with a Geiger-Müller counter after the free sulphur has been removed with hot acetone. The combined sulphur content is read from a calibration graph. The mean error is about 1 per cent. The operational time for a determination is only 8 to 10 min., but the extraction of the free sulphur takes 50 hr. G. S. Samu

Sci Res. Inst Tire Industry

KAPLENOV, M.YA.

404. Use of radioactive isotopes in the rubber
industry. M. YA. Kaplenov and A. S. Krasovskiy.
Izv. Akad. Nauk SSSR, 1957, 10, No. 9, p. 18. (In Russian.)
This paper describes the use of radioactive isotopes in the rubber
industry.

"APPROVED FOR RELEASE: 06/13/2000

CIA-RDP86-00513R000720510009-7

Nauchno-issledovatel'skiy institut shinnoy promyshlennosti.

APPROVED FOR RELEASE: 06/13/2000

CIA-RDP86-00513R000720510009-7"

KAPLUNOV, M. Ya., DOGADKIN, B. A., and TARASOVA, Z. N.

"Structure and Properties of Vulcanized Rubbers Obtained by the Action of Nuclear Radiation"

Truly Transactions of the First Conference on Radioaction Chemistry, Moscow,
Izd-vo AN SSSR, 1958. 330pp.
Conference -25-30 March 1957, Moscow

DOGADKIN, B. A., TARASOVA, Z.N., BAS'KOVSKAYA, M. O., and KAPLUNOV, M. YA.
(Scientific Research Institute of the Tire Industry)

"The Formation of Vulcanization Structures and Their Modification by Thermo-
Chemical Reaction and Fatigue."

Isotopes and Radiation in Chemistry, Collection of Reports of the
All-Union Sci. Tech. Conf. on Use of Radioactive and Stable Isotopes and
Radiation in National Economy and Science, Moscow, Izd-vo. AN SSSR, 1968, 200pp.

This volume publishes the reports of the Chemistry Section of the
All-Union Sci. Tech. Conf. on Use of Radioactive and Stable Isotopes and Radiation
in Science and the National Economy, sponsored by Acad. Sci. USSR and Main
Admin for Utilization of Atomic Energy under Council of Ministers USSR,
Moscow, 4-12 April 1967.

SOV/138-58-5-4/9

AUTHORS: Tarasova, Z.N.,
~~Kaplunov, M.Ya.,~~
Dogadkin, B.A.,
Karpov, V.L.
Bregier, A.Kh.,

TITLE: Vulcanisation by Nuclear Radiation (Vulkanizatsiya
pod vozdeystviyem yadernykh izlucheniya)

PERIODICAL: Kauchuk i Rezina, 1958, Nr 5, pp 14-21 (USSR)

ABSTRACT: During recent years it was found that polymeric materials undergo deep structural changes when irradiated with high energy rays (x-rays and nuclear radiation). Investigations on the vulcanisation of rubbers and rubber mixtures by radioactive irradiation were carried out (Refs.1-7). This method of vulcanisation is called "radiation" vulcanisation. The authors investigated the structure and the properties of radiation vulcanisates obtained by irradiating rubbers and their mixtures in an atomic reactor and by gamma radiation from Co⁶⁰. They also determined the conditions for preparing the homogeneous

Card 1/5

SOV/138-58-5-4/9

Vulcanisation by Nuclear Radiation

solid and multi-layer articles (tyres) by the action of nuclear radiation. The following rubbers were tested: natural, butadiene-styrene SKS-30A and SKS-30AM, isoprene SKI and sodium-butadiene SKB. The rubbers were vulcanised in thin layers in steel or aluminium moulds. The degree of cross-linking of the molecular chains of rubber during irradiation vulcanisation depends on the admixtures in the rubber and on the molecular weight of the rubber and is also affected by the presence of oxygen. The influence of the medium in which radiation takes place on the degree of structure formation of purified natural rubber during radiation vulcanisation is shown graphically in Fig.1; the influence of the medium on the kinetic formation of cross-links during radiation vulcanisation is tabulated (Table 1). On studying the infra-red spectra it was noted that the presence of phenyl-B-naphthylamine strongly inhibited the oxidation processes during irradiation. Spectra of electron paramagnetic resonance showed that samples of SKS-30AM irradiated on air had increased

Card 2/5

SOV/138-58-5-4/9

Vulcanisation by Nuclear Radiation

content of free radicals (Table 3). The effect of anti-oxidants on the properties of radiation vulcanisates is due, to a considerable extent, to the decreased number of double bonds in the presence of anti-oxidants. Fig.2: the relaxation of tension of rubbers subjected to radiation vulcanisation in air; Fig.3: the dependence of the constant of the rate of relaxation of the above vulcanisates on the number of cross-links. Due to the high power of penetration of nuclear rays, uniform vulcanisation is achieved throughout the sample (Table 4). The thickness of the vulcanising grate is defined by the dosage of absorbed energy, by the type and composition of the rubber, by the amount of fillers, plasticisers and anti-oxidants in the mixture and the conditions of irradiation as well as by some other factors. The radiation vulcanisates show thermo-mechanical stability surpassing the stability of vulcanisates containing thiuram. Activated carbon decreases the rate of chemical relaxation of radiation vulcanisates.

Card 3/5

SOV/138-58-5-4/9

Vulcanisation by Nuclear Radiation

During the irradiation of purified rubbers intense oxidation occurs; this leads to complete loss of unsaturation when the dosage of irradiation = 60 mega roentgen. In this case the amount of double bonds is decreased to 30%. Conditions for preparing homogeneous vulcanisation grades were found to be independent from the thickness of the samples (within the limits of 0.1 - 40 mm). The physico-mechanical and technological properties of rubbers prepared by vulcanisation radiation were tested (Table 5). It was found that these vulcanisates were more resistant to thermo-oxidative ageing than sulphur-vulcanisates (4 - 5 times at 130°C), undergo small residual deformation, show low hysteresis and high recovery when subjected to repeated deformation. The vulcanisation of model tyre casings 7.50 x 20, 1/5th natural size, was carried out (Fig.8). Changes in the physico-mechanical characteristics of various tyre cords during irradiation in an atomic reactor are given in Table 7. Members of the Institute

Card 4/5

SOV/138-58-5-4/9

Vulcanisation by Nuclear Radiation

im. L.Ya Karpov: V.B.Osipov, V.A.Gol'din, V.S.Pokrovskiy
and V.P.Afonin assisted during these experiments. There
are 8 figures, 7 tables and 14 references of which
10 are English and 4 Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy
promyshlennosti (Scientific-Research Institute for
the Tire Industry)

Card 5/5

69-20-3-2/24

AUTHORS: Dogadkin, B.A.; Tarasova, Z.N.; Kaplunov, M.Ya.; Karpov, V.L.;
Klauzen, N.A.

TITLE: The Structure and Properties of Rubbers Produced in Irradiation
Vulcanization (Struktura i svoystva rezin, poluchennykh pri
radiatsionnoy vulkanizatsii)

PERIODICAL: Kolloidnyy zhurnal, 1958, vol XX, Nr 3, pp 260-271 (USSR)

ABSTRACT: The vulcanization of rubber products by different nuclear
radiation sources has aroused great interest in the last
years. The irradiated rubber products usually show better
mechanical and chemical properties than those vulcanized by
present methods. Rubbers of the types SKS-30A, SKI, SKB,
and natural rubber were tested. The samples were irradiated
in an atomic reactor or by a Co^{60} source with a dose of
 10^7 - 10^8 r. The investigation of the infrared absorption
spectra has shown that in the 5.8μ field a broad absorption
band corresponds to the carbonyl groups of acids, aldehydes,
and ketones. In the 2.8μ field the absorption band of
the hydroxyl groups is shown. The density of the network
formed during irradiation vulcanization is determined by
the energy dose absorbed, by the type and the composition

Card 1/3

69-20-3-2/24

The Structure and Properties of Rubbers Produced in Irradiation Vulcanization

of the rubber, carbon black and antioxidant, as well as by the irradiation conditions. The number of cross bonds per 100 eV in an air medium is, 12 in extracted butadienstirol rubber; 4 in extracted natural rubber; 2.5 in technical SKS-30A. The structurization effect is increased by an increase in temperature, and decreased in the presence of an inhibitor (phenyl- β -naphthylamin). A correlation has been found between the relative rate of chemical stress relaxation and the density of the vulcanizate network which is due to the formation of C-C bonds during irradiation. The degree of crystallization in the rubber decreases when the irradiation doses are increased. At a dose of 20-30 $\cdot 10^6$ r the crystallization is the same as in sulfur vulcanizates of similar network density. Compared with sulfur vulcanizates, the irradiation samples show an aging resistance 4-5 times higher at 130°C, a lower residual deformation, a low hysteresis, a high temperature resistance, etc. There are 12 graphs, 6 tables, and 8 references, 5 of which are Soviet and 3 English.

Card 2/3

69-20-3-2/24

The Structure and Properties of Rubbers Produced in Irradiation Vulcanization

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti,
Moskva (Scientific Research Institute of the Tire Industry,
Moscow)

SUBMITTED: October 30, 1957

Card 3/3

1. Rubber—Vulcanization 2. Rubber—Properties 3. Rubber
—Radiation—Applications

KAPLUNOV, M., nauchnyy sotrudnik

Radiation and chemistry. IUn.tekh. 3 no.2:41-43 F '59.
(MIRA 12:1)

1. Nauchno-issledovatel'skiy institut shinnoy promyshlennosti.
(Radiochemistry)

15.9202

11.2211

31979
S/081/61,000/023/056/061
B106/B101

AUTHORS: Tarasova, Z., Kaplunov, M., Vas'kovskaya, M., Dogadkin, B.

TITLE: Vulcanization structures and their effect on fatigue

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 23, 1961, 560 - 561,
abstract 23P351. (Sb. "Vulkanizatsiya rezin. izdeliy",
Yaroslavl', 1960, 25 - 42)

TEXT: Vulcanizates of Hk(NK), butadiene styrene, and Na butadiene rubber with the accelerators Thiuram, diphenyl guanidine, captax, altax, and radiation vulcanizates of these rubbers have been examined to determine the type of cross linking. The latter was determined by isotopic exchange with sulfur, vulcanizing accelerators, vulcanizates containing radioactive sulfur, and by the method of determining the rate constant of relaxation of tension at constant deformation (Dogadkin, Tarasova, Kolloid. zhurnal, v. 15, no. 5, 1953, 347). The factors determining the exchangeability are the nature of the rubber and the composition of the vulcanizing group. The poorer the exchangeability, the higher the thermomechanical stability. The exchangeability of sulfur compounds decreases with increasing

Card 1/2

15. 9120

2209, 1403, 1138 only

86295

S/190/60/002/008/007/017
B004/B054

11. 2210

AUTHORS:

Tarasova, Z. N., Kaplunov, M. Ya., Kozlov, V. T.,
Klauzen, N. A., Dogadkin, B. A.

TITLE:

Interaction of Sulfur With Natural Rubber Under the Action
of Ionizing Radiation

PERIODICAL:

Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 8,
pp. 1201-1206

TEXT: The authors study the problem of production of radiation-resisting rubbers, the conditions for a common vulcanization of irradiated and sulfurated rubbers, and the modification of rubbers treated with radiation. The present paper gives the first informative results of investigation of the effect of radiation by Co^{60} on rubber in the presence of sulfur. A considerable sulfur addition occurred at 25°C , and was accelerated by an increase in the radiation dose and temperature, particularly by addition of hexane chloro ethane. In thermal vulcanization, the admixture of chloro derivatives showed no effect on sulfur addition. The presence of sulfur delays the structuration as compared with rubber without sulfur admixture.

Card 1/3

86295

Interaction of Sulfur With Natural Rubber Under S/190/60/002/008/007/017
the Action of Ionizing Radiation B004/B054

But structuration increases also here between -80°C and $+100^{\circ}\text{C}$ with increasing temperature. Pure rubber showed at 50°C a reversion of the structuration process, which was not observed in the presence of sulfur in the temperature range investigated. A study of the infrared spectra in argon of irradiated rubbers with and without sulfur showed a decrease in intensity of the 840 cm^{-1} band due to a reduced degree of nonsaturation. This effect was more intense in the presence of sulfur. The decrease in intensity of the 2940 and 1450 cm^{-1} bands due to a reduced number of CH_2 groups or ring formation was, however, more intense in the presence of sulfur. An investigation of the sulfur exchange at 120°C in irradiated rubber tagged with radioactive sulfur, carried out by a method described in Ref. 7, showed that about 40% of sulfur is exchangeable. This amount does not depend on the radiation dose (up to 100 megaröntgens). The high degree of exchangeability is ascribed to a formation of polysulfide groups. Sulfurous rubbers with addition of hexachloro ethane showed, on irradiation with 20 megaröntgens, maximum values of tensile strength (about 130 kg/cm^2) and of elongation. When irradiating pure rubber, a maximum (about 100 kg/cm^2) is only attained at 50-70 megaröntgens. Sulfurous irradiated vulcanizates showed a faster stress relaxation than irradiated vulcanizates free from

Card 2/3

86295

Interaction of Sulfur With Natural Rubber Under S/190/60/002/008/007/017
the Action of Ionizing Radiation B004/B054

sulfur. The authors assume that sulfur addition leads to a more homogeneous and regular structure since secondary reactions causing chain ramification are inhibited. There are 7 figures and 7 references: 3 Soviet, 3 US, and 1 British.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti
(Scientific Research Institute of the Tire Industry)

SUBMITTED: March 24, 1960

Card 3/3

2209
1153
15-9120 1372

83838

S/138/60/000/004/004/008
A051/A029

AUTHORS: Breger, A.Kh., Kaplunov, M.Ya., Vaynshteyn, B.I., Vizel',
Ya.M.

TITLE: A Comparative Evaluation of the Effectiveness of Various
Sources of Nuclear Emissions for the Vulcanization Process
of Tires by Irradiation 19

PERIODICAL: Kauchuk i Rezina, 1960, No. 4, pp. 17 - 22

TEXT: The use of nuclear energy has increased in chemical techno-
logy (Refs. 1 - 3, 5, 7, 14). Rubber acquires new properties in vulcaniza-
tion by irradiation. These vulcanizates have an elevated resistance to ther-
mal and thermo-acidic aging, an elevated thermomechanical resistance and high
resistance to repeated deformations. The importance of selecting the proper
source of radiation in the radiation vulcanization of tires is stressed. The
geometry of the emitter must be determined and the effectiveness of the dif-
ferent radiation sources must be evaluated. The purpose of this article was
to solve these problems in order to apply the process of vulcanization by ir-

Card 1/3

83838

S/138/60/000/004/004/008
A051/A029

A Comparative Evaluation of the Effectiveness of Various Sources of Nuclear Emissions for the Vulcanization Process of Tires by Irradiation

radiation to the tubeless 6.70 - 15 tire of the "Volga" automobile. The following problems were investigated: 1) an evaluation of the field uniformity of the doses on the cross-section of the tread, 2) a computation of the radiation time at a given energy output of the emitter or estimating the energy output of the emitter according to the given vulcanization period (the energy of the emitter is taken to be the γ -emission energy), 3) determining the power efficiency factor in each individual case of the system's γ -emission efficiency output. The average integral dose of radiation needed for the vulcanization process was taken to be $25 \cdot 10^6$ r (Refs. 6 - 8). Two types of emission sources were investigated, namely, a circulating contour (nuclear reactor-radiation installation) where the γ -emitter is an indium-gallium alloy with 16.5 atomic % of indium), and heat-emitting wastes of ASBP-U (VVR-Ts)-type nuclear reactor with a heat capacity of 10 Mw. Each source investigated is described in detail. As a result of the investigations several conclusions are drawn: 1) The comparative evaluation of the two sources for radiation vulcanization of tires showed that a circulating contour power efficiency factor ($\eta \sim 2.0\%$) had greater possibilities as a γ -emitter. There were

Card 2/3

34896

S/081/62/000/003/085/090

B 162/B101

11.2211
15.9300

AUTHORS: Dogadkin, B. A., Tarasova, Z. N., Kaplunov, M. Ya., Breger, A. Kh., Kepersha, L. M., Vaynshteyn, B. I., Vizel', Ya. M., Karpov, V. L.

TITLE: Intensification of the process of radiation vulcanization and technical principles of an experimental installation for radiation vulcanisation of tyres

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 3, 1962, 595 - 596, abstract 3P275 (Sb. "Radioakt. izotopy i yadern.izlucheniya v nar. kh-ve SSSR, v. I", M., Gostoptekhizdat, 1961, 184 - 196)

TEXT: An investigation was made into the effect of medium (air and vacuum), temperature (from -196 to 100°C), sensitizers and inhibitors on radiation vulcanization under the action of Co^{60} γ - radiation of butadiene, butadiene-styrene and natural rubber. The degree of cross-linking in air is higher than in vacuum. In the presence of 2 % phenyl - β - naphthyl-amine the radiation-chemical yield of cross-links per 100 ev of absorbed

Card 1/3

Intensification of the process ...

S/081/62/000/003/085/090
B162/B101

energy drops by half for butadiene rubber in vacuum. The decrease in non-saturation is only partially explained by cross-linking and oxidation, and in the main this phenomenon is probably connected with the formation of intra-molecular rings. The cross-linking at different temperatures depends to a large extent on the structure of the rubber. Aliphatic polyhalides reduce the required radiation dose by half (to 25 Mr) and ensure the production of rubbers with a static strength equal to the strength of the best sulphur vulcanized rubbers. Vulcanization of rubbers containing carboxyl by the combined action of metal oxides and nuclear radiation (dose 10 Mr) gives vulcanized rubbers with high thermal stability and high strength properties. An investigation was made into the kinetics of the addition of styrene and 2,5 -dichlorostyrene to natural rubber and butadiene-styrene rubber and to mixtures of these with channel black with irradiation in Ar. An acceleration of vulcanization was observed in the presence of these monomers and vulcanized rubbers were obtained which possessed high thermomechanical stability and strength. The technical principles of a technological process for an experimental installation for radiation vulcanization of tyres are examined. Different types of γ -radiation sources were compared: radiation In-Ga loop of a nuclear reactor,

Card 2/3

TARASOVA, Z. N.; KAPLUNOV, M. Ia.; KOZLOV, T. V.; KLAUZEN, N. A.; DOGADKIN, B.A.

Interaction of sulphur and natural rubber under ionizing radiation.
Chem prum 11 no.11:601-604 N '61.

1. Vyzkumnyy ustav prumyslu pneumatik, Moskva.

S/190/62/004/008/010/016
B101/B180

AUTHORS: Tarasova, Z. N., Fogel'son, M. S., Kozlov, V. T.,
Kashlinskiy, A. I., Kaplunov, M. Ya., Dogadkin, B. A.

TITLE: Epr study of the radiation vulcanization of rubber in the
presence of sulfur and hexachlor ethane

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 8, 1962,
1204-1209

TEXT: Recorded epr spectra were used to study the formation of free radicals during the radiation polymerization of natural rubber (NR) and mixtures of NR with 2wt.% sulfur or 10wt.% C_2Cl_6 . Irradiation was conducted at $-196 - +20^{\circ}C$ with Co^{60} at a dose of 6 - 11 Mr. Results:

(1) Long-lived radicals with an initial concentration of $(1-2.5) \cdot 10^{14} mg^{-1}$ form in NR and its mixtures with S or C_2Cl_6 at $20^{\circ}C$ and 6-8Mr.

(2) Radicals of different lives form with irradiation at $-196^{\circ}C$. Their initial concentrations in NR, NR + C_2Cl_6 and in NR + S are

✓

Card 1/3

S/190/62/004/008/010/016
B101/I180

Epr study of the radiation ...

$(4.9 \pm 0.7) \cdot 10^{15} \text{ mg}^{-1}$, $(11 \pm 2) \cdot 10^{15} \text{ mg}^{-1}$, and $(2.6 \pm 0.6) \cdot 10^{15} \text{ mg}^{-1}$, respectively. The inhibiting effect of S is due to delocalization of an electron in

the S_8 ring. (3) If the NR + C_2Cl_6 sample irradiated at -196°C is slowly brought to room temperature, structuration occurs near the vitrification temperature (-70°C). Short-lived radicals disappear and the concentration of free radicals approaches the room temperature level. (4) Gradual heating of the NR + S sample yields new short-lived radicals with a g factor of 2.027 ± 0.003 which is typical of S radicals. The radicals whose concentration reaches a maximum of approximately

$6 \cdot 10^{14} \text{ mg}^{-1}$ at -80°C are formed by reaction between NR and S, the S_8 ring being ruptured. (5) After irradiation, crystalline C_2Cl_6 showed an intensive epr signal, from which it is assumed that various types of radical are formed. The formation of $\dot{C}Cl_3$ radicals was confirmed by the analytical detection of chloroform. (6) Structuration of NR irradiated at low temperatures is supported by C_2Cl_6 and impeded by S which increases

Card 2/3

Epr. study of the radiation ...

S/190/62/004/008/010/016
B101/B180

the static strength of the radiation vulcanizate. (7) Crystalline S
showed only a weak epr signal. There are 5 figures.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti
(Scientific Research Institute of the Tire Industry)

SUBMITTED: May 12, 1961

Card 3/3

S/844/62/000/000/095/129
D204/D307

AUTHORS: Dogadkin, B. A., Tarasova, Z. N., Kaplunov, M. Ya., Kozlov, V. T., Klauzen, I. A. and Matveyev, V. S.

TITLE: The interactions of sulfur with polymers under the action or irradiation

SOURCE: Trudy II Vsesoyuznogo soveshchaniya po radiatsionnoy khimii. Ed. by L. S. Polak. Moscow, Izd-vo AN SSSR, 1962, 554-562

TEXT: The interactions of S with natural rubber, 1,4-cis-polybutadiene, butadiene-styrene and butyl rubber was studied, under irradiation from a Co⁶⁰ source. S added on to natural rubber at 25 - 100°C and to butadiene-styrene rubber and polyethylene at 25°C, under argon, in amounts increasing with the dose (0 - 120 Mr), the rate of addition being faster at higher temperatures. At room temperature the amount of S added on is independent of the initial S-content in the starting mixture (1 - 10% by weight). The addition

Card 1/3

S/844/62/000/000/095/129
D204/D307

The interactions of ... 1

was promoted by C_2Cl_6 . The presence of S hindered the development of structurization, which was, however, promoted by raising the temperature from -80 to $100^\circ C$. Pure natural rubber developed cross-linking only up to $\sim 50^\circ C$, above which temperature the process was reversed; this reversal was not observed in the presence of 2% S, up to $100^\circ C$. The presence of 1 - 4% S in CKC-30AM (SKS-30AM) butadiene-styrene rubber led only to a slight reduction in the degree of cross-linking on irradiation. The loss of unsaturation and $-CH_2-$ groups on irradiation was studied (by ir spectroscopy) on natural rubber both in the presence and absence of S, and was found to be greater in the latter case. The S adds on in a form capable of isotopic exchange with elemental sulfur. Initially 70% of the added sulfur may be exchanged in natural and butadiene-styrene rubbers; this value falls with irradiation to a constant 40% at 50 - 120 Mr. Radiational vulcanizates of natural rubber exhibit increased tensile strength when the polymer contains 2% S, particularly at $100^\circ C$; in general, the strength increases with the dose of irradiation. The best strengths were obtained for a mixture of

Card 2/3

S/844/62/000/000/097/129
D234/D307

AUTHORS: Tarasova, Z. N., Dzantiyev, B. G., Yegorov, Ye. V., ~~Kap-~~
~~lunov, M. Ya.~~, Petrova, S. B., Sobolev, V. S. and Dogad-
kin, B. A.

TITLE: Investigation of rubber structurization under the action
of accelerated electrons

SOURCE: Trudy II Vsesoyuznogo soveshchaniya po radiatsionnoy khi-
mii. Ed. by L. S. Polak. Moscow, Izd-vo AN SSSR, 1962,
569-575

TEXT: Natural butadiene-styrene and carboxylate rubbers were in-
vestigated. The energy of the electrons was 0.6, 1.6 and 2 Mev. The
specimens were 0.02 - 0.3 mm thick films, 60 x 60 x 1 mm plates
and 10 mm thick washers. Irradiation in free state in air from an
accelerator (0.2 - 0.8 megarad/sec) showed less destruction than
that from a Co⁶⁰ source in inert atmosphere. In natural rubber, des-
truction is much greater in the first case. In filled natural rub-
ber it is less in the first case, in pre-vulcanized mixtures of

Card 1/2

S/844/62/000/000/097/129
D234/D307

Investigation of rubber ...

carboxylate rubber it is equal in both cases. Thermomechanical stability of electron-irradiated vulcanized rubbers was about 4 times as high as that of Co^{60} irradiated rubbers. Those of carboxyl containing rubbers show high strength and wear resistance (abrasion index = $115 \text{ cm}^3/\text{kWh}$ for nonfilled rubbers irradiated with 24 megarad and $200 \text{ cm}^3/\text{kWh}$ for nonfilled sulphur rubbers). Chemical relaxation curve of these rubbers shows destruction and re-grouping of salt bonds in its initial part. There are 6 figures and 2 tables.

ASSOCIATION: NII shinnoy promyshlennosti (NII of the Tire Industry); Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics, AS USSR)

Card 2/2

S/138/62/000/012/009/010
A051/A126

AUTHORS: Khozak, V. K., Vaynshteyn, B. I., Breger, A. Kh., Kaplunov, M. Ya.,
Syrkus, N. P.

TITLE: Calculations of a radio-chemical equipment emitter for tire vulcani-
zation using gamma radiation of spent heat-emitting sectors from
a nuclear energy reactor.

PERIODICAL: Kauchuk i rezina, no. 12, 1962, 26 - 29

TEXT: Physical calculations were carried out on an emitter for radio-
vulcanization of tires, using as the gamma source spent heat-emitting sectors,
TBC (TVS), of a nuclear energy reactor. The efficiency coefficient (e.c.) of
the γ -emitter is about 1% (at self-absorption in TVS - 60%). The use of various
heat-emitting elements instead of TVS increases the equipment output by about 5
times. Using the TVS as the gamma source, which is the "waste product" of the
reactor, increases the economic efficiency of the nuclear energy reactor. The
calculations are based on the use of the TVS in the nuclear energy reactor with
a thermal power of 760 Mw. The emitter chosen consisted of surfaces composed

Card 1/2

Calculations of a radio-chemical equipment...

S/138/62/000/012/009/010

A051/A126

of TVS. Over a period of 180 days, the average activity of the emitter was found to be $\sim 10^7$ g-equiv. radium. Mathematical calculations showed that at a permissible non-uniformity of the field of dosages of $\pm 15\%$, the ratio of the average absorbed dosage for the characteristic points to the lowest dosage absorbed is $\frac{D_{\text{aver}}}{D_{\text{min}}} = 1.10 \pm 1.15$. The average power of the absorbed dosage during the working time of one series of TVS (180 days) was found to be 170 rad/sec. Calculations using heat-emitting elements as gamma source formed in the disassembly of the TVS showed that in this case the e.c. for gamma emission can be increased by about 5 times which is explained by the considerable drop on the self-absorption of the gamma-emitting sources. There are 5 figures. ✓

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti i nauchno-issledovatel'skiy fiziko-khimicheskiy institut im. L. Ya. Karpova (Scientific Research Institute of the Tire Industry and Scientific and Research Physico-Chemical Institute, im. L. Ya. Karpov)

Card 2/2

L 13660-63 EWP(j)/EPF(c)/EWT(m)/BDS AFFTC/ASD - Pc-4/Pr-4 RM/JXT(IJP)
 ACCESSION NR: AP3001426 S/0138/63/000/004/0010/0013 69
 67

AUTHOR: Kaplunov, M. Ya.; Khozak, V. K.; Chernilin, Yu. F.; Korneyev, V. T.

TITLE: Radiation vulcanization¹⁴ of automobile tires and detachable tread in the
 basin of IRT reactor¹⁵

SOURCE: Kauchuk i rezina, no. 4, 1963, 10-13

TOPIC TAGS: radiation vulcanization, automobile tire, protector ring, gamma radiation

ABSTRACT: The irradiation was conducted in the basin of the IRT reactor, where experimental samples of automobile tires and protector rings were vulcanized by gamma radiation, while the reactor was shut off, and by mixed neutron and gamma radiation while it was in operation. The rubber compounds used were of natural and butadiene-styrene rubbers, to which were added 50% by weight of channel carbon black and 10% of the sensitizer hexachloroethane. The cord consisted of capron polyamide fiber. The steel mold of the tire and the protector rings were enclosed in an aluminum casing, which was screened with 1-mm sheet cadmium to protect them from neutron radiation. The protector rings were further insulated with boron-carbide. Since the irradiation in the non-operating reactor did not produce the desired effect due to the low potency of gamma rays, further experiments were

Card 1/2

I 13660-63

ACCESSION NR: AP3001426

conducted only when the reactor was in operation. The quanta of gamma irradiation received by the tires averaged 25 Mradon for a period of 45 hours. The obtained samples were subjected to standard static and dynamic tests, showing that radiation vulcanization was superior to conventional vulcanization, producing a tire with a 30% lower rolling resistance, as well as a 15-20C lower temperature within the tire during the rolling test. Preliminary road tests demonstrated a 30-40% superior wear for the radiation-vulcanized tires. Orig. art. has: 3 charts.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promy*shlennosti i institut atomnoy energii im. I. V. Kurchatova (Scientific Research Institute of the Tire Industry and Institute of Atomic Energy)

SUBMITTED: 00

DATE ACQ: 30May63

ENCL: 00

SUB CODE: 00

NO REF SOV: 005

OTHER: 002

Card 2/2

S/089/63/014/002/016/019
B102/B186

AUTHORS: Yegorov, Ye. V., Kaplunov, M. Ya.

TITLE: Soveshchaniye po primeneniyu uskoriteley zaryazhennykh
chastits v radiatsionnoy khimii (Conference on the Use of
Charged-particle Accelerators in Radiation Chemistry)

PERIODICAL: Atomnaya energiya, v. 14, no. 2, 1963, 222-224

TEXT: The Conference was held in May 1962 by the Otdeleniye khimicheskikh nauk AN SSSR (Department of Chemical Sciences AS USSR). More than 50 lectures were delivered. The opening address was read by the Academician N.N. Semenov who gave a review on the development of radiation chemistry during the last 15 years. B.A. Kononov reported on design and construction of betatrons for therapy and research at the Tomskiy politekhnicheskii institut (Tomsk Polytechnic Institute); the 25-Mev betatron developed has a mean current of 10^{-8} a and a dose rate of ~ 5000 r/min at 1m distance. S.P. Kapitsa reported on a microtron developed at the Institut fizicheskikh problem AN SSSR (Institute of Physical Problems AS USSR). F.G. Zheleznyakov gave details on new small-scale electrostatic

Card 1/3

S/089/63/014/002/016/019
B102/B186

Soveshchaniye po primeneniyu

generators of 1-2 Mev; in 1963 a 25-kw cascade generator will be built which will deliver 2.5-Mev electrons. O.A. Val'dner from the Moskovskiy inzhenerno-fizicheskiy institut (Moscow Institute of Physical Engineering) reported on new accelerators designed and constructed at his institute (linear pulsed travelling-wave electron accelerators of 3,5, and 10 Mev and 500-700 w). V.L. Karpov and L.V. Chepel' (Fiziko-khimicheskiy institut AN SSSR im. L. Ya. Karpova - Physicochemical Institute AS USSR imeni L. Ya. Karpov) spoke on the technical parameters of electron accelerators used for pilot-plant radiation-chemical processes. The necessary properties of electron accelerators used for rubber vulcanization was dealt with by Z.N. Tarasova, V.K. Khozak, Ye.V. Yegorov, M.Ya. Kaplunov, and V.S. Sobolev (NII shinnoy promyshlennosti - NII of the Tire Industry; Institut khimicheskoy fiziki AN SSSR - Institute of Chemical Physics AS USSR). A.P. Sechenkov reported on the construction of an electrostatic accelerator (0.5 Mev, 250 μ a), D.I. Margolin on the ЭГ-2,5 (EG-2,5) electrostatic generator (0.3-2.0 Mev; $5 \cdot 10^{-3}$ -200 μ a), P.Ya. Glazunov on a 1.2-Mev electrostatic generator and N.Ya. Buben on the 2- and 0.8-Mev accelerators of the Institute of Chemical Physics AS USSR. It was pointed out that linear accelerators for special

Card 2/3

Soveshchaniye po primeneniyu ...

S/089/63/014/002/016/019
B102/B186

purposes with 2-8 Mev and 3 ma and electrostatic accelerators with 1.5 Mev and 1-5 ma should be developed and the following technical problems should be solved: extraction of 20 - 50 kw beams from the accelerator; beam deflection about 90° and beam scanning; development of filters for deep dose leveling; introduction of the beam into reaction vessels at up to 100 atm and 300°C; reduction in price of 1 kwhr of the beam power. ✓

Card 3/3

TARASOVA, Z. N.; DOGADKIN, B. A.; LYKIN, A. S.; KAPLUNOV, M. Ya.; KHOZAK, V. K.;
KOZLOV, V. T.; SOBOLEV, V. S.; KLAUZEN, N. A.

"Struktura i svoystva vulkanizatorov, poluchennykh kombinirovannym deystviem
sery i ioniziruyushchikh izlucheniy."

report submitted for 35th Intl Cong, Industrial Chemistry, Warsaw, 15-19
Sep 64.

Nauchno-issledovatel'skiy institut shinnoy promyshlennosti, Moscow.

ACCESSION NR: AP4017164

S/0138/64/000/002/0020/0023

AUTHORS: Khozak, V. K.; Vaynshteyn, B. I.; Krasnoshchekova, N. A.; Breger, A. Kh.; Kaplunov, M. Ya.; Syrkus, N. P.

TITLE: Design of a setup for radiation vulcanization of tires with the use of Co⁶⁰ Gamma radiation

SOURCE: Kauchuk i rezina, no. 2, 1964, 20-23

TOPIC TAGS: radiation vulcanization, tire vulcanization, cobalt 60, Gamma radiation, biplanar radiator, efficiency

ABSTRACT: The authors have designed three variants of a setup to effect radiation vulcanization of tires (260-20 and 6.70-15) with Co⁶⁰ Gamma radiation. The variants were: 1) a setup with one biplanar radiator of constant size (130 x 130 cm, 40 cm apart); 2) a setup with one biplanar radiator of different size for each (same as 1 for the 260-20 tire; 100 x 100 cm, 40 cm apart for the 6.70-15 tire); and 3) a setup with two biplanar radiators of constant size for each (the size of 1 for the 260-20 tire; the size of the second radiator in 2 for the 6.70-15 tire). The efficiency of each variant was computed according to the formula $\eta = \frac{100 W_{abs}}{W_0}$

Card 1/2

ACCESSION NR: AP4017164

where W_0 = the power of the gamma-ray source and $W_{abs}^{min} = P_{min} v d$ (P_{min} is the minimal absorbed radiation dose, v is the volume of the irradiated object, and d is the density of the irradiated object). The efficiency of all three variants for the 260-20 tire proved to be 2.8. For the 6.70-15 tire, the efficiency of the first variant was 0.7, for the second and third, 1.3. The authors' computations have shown that for the duration of vulcanization adopted (22 hours for the 260-20 tire and 19 hours for the 6.70-15 tire), it was necessary to have a radiator with a total activity of $\sim 10^6$ gram-equivalents of radium. The use of a press form of aluminum alloy with walls no thicker than 15 mm permitted the productivity of the setup (with the activity indicated) to be almost doubled. Orig. art. has: 1 figure, 1 table, and 2 formulas.

ASSOCIATION: Nauchno-issledovatel'skiy fiziko-khimicheskiy institut im. L. Ya. Karpova (Scientific Research Physical-Chemical Institute); Nauchno-issledovatel'skiy institut shinnoy promyshlennosti (Scientific Research Institute of the Tire Industry)

SUBMITTED: 00

DATE ACQ: 23Mar64

ENCL: 00

SUB CODE: MA

NO REF SOV: 005

OTHER: 002

Card 2/2

L 17560-65 EWO(j)/EWT(n)/EPF(c)/EPF(n)-2/EPR/EWT(j)/I/EMAK/EMAK

Pr-1 Ts-1 let. fu-1

ACCESSION NR: AP4049784

S/0135/64/000-011-0008-0003

AUTHOR: Kaplanov, M. Ya.; Khozak, V. K.; Kozlov, V. T.; Sobolev, V. S.; Iarasova, Z. N.; Borisov, V. A.; Karpov, V. L.; Dogadkin, B. A.

TITLE: Thermoradiation vulcanization of tires ✓

SOURCE: Kauchuki rezina, no. 11, 1964, 28-33

TOPIC TAGS: thermoradiation vulcanization, rubber structure, sulfur vulcanization, tire wear, thermal aging

ABSTRACT: The effectiveness of the method of thermoradiation vulcanization was investigated in the form of experiments increasing the quality of the tires. The experiments consisted of is spent, heat-liberating elements from an atomic reactor. The total activity amounted to 76,000 gram-equivalents of radium. Not more than six 5.66-17 tires could be treated at one time in a cylindrical vat with a hermetically closed cover. The tires had a reduced content of vulcanizing agent; one contained a sensitizer of radiation structuring in perchlorethane. Irradiation was in an argon medium at 0.35 atm pressure. The temperature did not exceed 40C. Radiation doses amounted to 5, 9, 13, and 20 Mrad. The resulting vulcanizate had the optimum relationship of crosslinks of the type -C-C- and

Card 1/2

L 40721-65

ACCESSION NR: AP5010849

ization and graft polymerization and the second, with radiochemical versions in polymers, radiation stability, and radiation induced graft polymerization.

B. L. Tsetlin, S. R. Rafikov, and others reported on radiation-induced graft polymerization, utilizing a variety of substrates.

It was found that the rate of graft polymerization increases with increasing dose rate and dose, and that the yield of grafted polymer is proportional to the square root of the intensity of the dose. Radiation-induced graft polymerization was also observed in the presence of water vapor.

It was also found that the rate of graft polymerization is proportional to the square root of the intensity of the dose. Radiation-induced graft polymerization was also observed in the presence of water vapor.

It was also found that the rate of graft polymerization is proportional to the square root of the intensity of the dose. Radiation-induced graft polymerization was also observed in the presence of water vapor. The effect and mechanism of the action of

methanol vapor on this process were discussed. B. L. Tsetlin, S. R.

Card 2/4

L 40721-65

ACCESSION NO: AF5010649

Rafikov and others proved the feasibility of radiochemical synthesis of mineral-organic materials (carbon blacks, mineral fillers, etc.) by vapor-phase graft polymerization. These materials combine the properties of ion-exchange resins and inorganic sorbents.

Interesting changes in natural and synthetic rubber, and in poly(vinyl-chloride) were investigated with the use of infrared spectroscopy by N. A. Slovokhotova, V. A. Kargin, and coworkers. They showed that on irradiation with gamma-rays in vacuum, in addition to the degradation of double bonds, there is cross-linking. The cross-linking is characterized by the appearance of new bands in the infrared spectrum, which are characteristic of the formation of new chemical structures.

Also, the authors demonstrated the effect of radiation-induced vulcanization of ethylene-propylene rubber. They also investigated the effect of the nature of the rubber, filler, and oxidizing agent on radiational aging of the product and developed means of stabilizing rubber under static loads toward radiation.

Card 3/4

L 40721-65

ACCESSION NR: AP5010849

V. I. Karpov and coworkers studied the effects of polyfunctional monomers and sensitizers in radiation induced cross-linking of polyolefins. Pa the chemical cross-linking of polyolefins in the presence of sensitizers was reported by L. I. Chernyshev and N. A. Bogdanov. Interesting data on the effects of sensitization cover 13 rad on polyethylene: the appearance of a new phase of secondary properties. Preliminary data on the radiation stability of polyamide filters by radiochemical methods were presented by B. L. Tsetlin, N. V. Mikhaylov, and others. The above are only the highlights of the papers presented by numerous authors.

Reports on foreign developments were made by members who had travelled abroad. Future developments of polymer radiochemistry were discussed.

ASSOCIATION: none

SUBMITTED: 00

ENCL: 00

SUB CODE: 00, GC

NO REF SOV: 000

OTHER: 000

ATD PRESS: 3229-F

Card 4/4

KAPLUNOV, M.Ya.

Twentieth International Congress on Theoretical and Applied
Chemistry. Kauch. i rez. 24 no.11:53-57 '65.

(MIRA 19:1)

S/193/62/000/002/001/006
A004/A101

AUTHORS: Kaplunov, P. F., Grigor'yev, V. N.

TITLE: Rapid-heating sectional furnace for the heat treatment of electrically welded pipes

PERIODICAL: Byulleten' tekhniko-ekonomicheskoy informatsii, no. 2, 1962, 14-16

TEXT: The authors describe the design and operation of a sectional furnace for heat-treating electrically welded pipes. The furnace consists of a number of sections mounted in one line and fuelled by gas. Each section consists of a welded or cast jacket lined with refractories, a layer of insulating material being placed between jacket and lining. The pipes are conveyed by a furnace roller conveyer made of carbon steel. The heat condition control of the first furnace zones ensures a forced heating with the desired temperature drop. The thermal load of the last furnace zones is, in a number of cases, reduced and automatically controlled. The ratio of the peripheral rotation speed to the pipe feed rate at a given angle of inclination of the furnace conveyer rolls increases with a decreasing pipe diameter. The accelerated normalization of electrically welded pipes during rapid heating to 900°C in the sectional furnace

Card 1/2

Rapid heating sectional furnace ...

S/193/62/000/002/001/006
AOC4/A101

with subsequent air-cooling ensures a full phase recrystallization over the whole pipe section, including the welding seam, resulting in a uniform increase in strength limits and yield point of the pipe walls. The sectional furnaces of Gipromez design are fitted with double-line burners, mounted tangentially in the lateral walls of the sections, which ensure a multiple circulation of the furnace gases. To save fuel, the air is preheated in recuperators. The authors give a detailed description of a sectional single-flow furnace of the Gipromez system built at the Moskovskiy trubnyy zavod (Moscow Pipe Plant). The furnace consists of 24 sections with water-cooled rollers and individual motors. Depending on the assortment of pipes, the pipe traveling speed can be adjusted in the range of 10 - 50 m/min. Automatic heating regulation is effected by zones comprising eight sections each. The temperature of each section is measured by radiation pyrometers, the readings being indicated by twelve-point ЭПН-16 (EPP-16) potentiometers, while the temperature control in each section is effected by the radiation pyrometer, potentiometer with rheostat pickup, isodromic ИР-130М (IR-130M) regulator and servomechanism. There is 1 figure.

Card 2/2

KAPLUNOV, A. P.

Docent, Candidate of Technical Sciences
"The Longwall Method of Ore Mining in
Using the Horizontal Cut and Fill System"
Tsvet. Met. 14, No. 10-11 Oct.- Nov. 1939.

Report U-1506, 4 Oct 1951

KAPLUNOV4R8P8

600

1. KAPLUNOV, R.P.

2. USSR (600)

Moscow Mining Institute imeni I. V. Stalin "Losses and Depletion of Nonferrous Metal Ores Mined in Foreign Countries" Tsvet. Met. 14, No. 12, December 1939.

9. ~~USSR~~ Report U-1506, 4 Oct. 1951.

KAPLUNOV, R. P.

Kaplunov, R. P. "The influence of waste and ore exhaustion on the effectiveness of working ore minerals", in the collection entitled: Voprosy gornogo dela, Moscow, 1948, p. 437-54.

SO: U-2888, 12 Feb. 53, (Letopis' Zhurnal 'nykh Statey, No. 2, 1949).

KAPLUNOV, R. P.

USSR/Mining Methods
Iron Ores

Jul 48

"The Problem of Utilizing Low-Grade Iron Ore," N. A. Yartsev, R. P. Kaplunov, 3½ pp

"Gor Zhur" No 7

Discusses necessity of extensive exploitation of low-grade ore deposits, as rich ore reserves will not satisfy demand. Refers to low-grade ore deposits of the Kerch type, containing about 37 - 38% iron, and deposits of ferrous quartz, containing about 30 - 45% iron. Mentions Zaymandrovo Rayon, Kimkan, Karsapskaya, and Krivoy Rog, where ferrous quartz reserves are inexhaustible.

PA 33/49 T90

KAPLUNOV, R.P., dotsent; TARASOV, L.Ya., gornyy inzhener

Increasing the efficiency of mining methods. Gor. zhur. 122
no.1:5-10 Ja '48. (MIRA 8:9)

(Mining engineering)

Kaplunov, R.P., Prof.: Panin, I.M.

Mining Engineering

Examining elements of mining work by the method of centrifugal modeling, and
determining the time period, Nauch. trudy Mosk. gor. inst., no. 8, 1950

Monthly List of Russian Accessions, Library of Congress, October 1952. UNCLASSIFIED.

KAPLUNOV, R. P.

The Committee on Stalin Prizes (of the Council of Ministers USSR) in the fields of science and inventions announces that the following scientific works, popular scientific books, and textbooks have been submitted for competition for Stalin Prizes for the years 1952 and 1953. (Sovetskaya Kultura, Moscow, No. 22-43, 20 Feb - 3 Apr 1954)

<u>Name</u>	<u>Title of Work</u>	<u>Nominated by</u>
Agoshkov, M.I.	"Textbook of Mining" (two books)	Metallurgizdat
Alyamskiy, A. M.		
Voronin, V.N.		
Gorodetskiy, P.I.		
<u>Kaplunov, R.P.</u>		
Matveyev, M.A.		
Polyakov, N.N.		
Tarasov, L. Ya.		
Seledkov, Yu.V.		

DOC: W-35704, 7 July 1954

KAPLUNOV, Rodion Pavlovich, professor, doktor; PROKOP'YEV, Yevgeniy Petrovich, professor, doktor; STARIKOV, Nikolay Antonovich, professor, doktor; BRICHKIN, Aleksandr Vasil'yevich, professor, doktor; MALAKHOV, G.M., professor, doktor, retsenzent; STESHENKO, A.I., retsenzent; NEDIN, V.V., professor, doktor, retsenzent; MARTYNOV, V.K., kandidat tekhnicheskikh nauk, retsenzent; ARSENT'YEV, A.I., kandidat tekhnicheskikh nauk, retsenzent; KULIKOV, V.V., kandidat tekhnicheskikh nauk, retsenzent; DEMIN, N.S., doktor tekhnicheskikh nauk, retsenzent; TARASOV, L.Ya., redaktor; PARTSEVSKIY, V.N., redaktor; BEKKER, O.G., tekhnicheskii redaktor

[Underground workings of ores and deposits] Podzemnaya razrabotka rudnykh i rossypnykh mestorozhdenii. Moskva, Gos.nauchno-tekhn. izd-vo lit-fy po chernoi i tsvetnoi metallurgii, 1955. 680 p.
(Mining engineering) (MIRA 9:3)

KAPLUNOV, RODION FAVLOVICH.

Epr.
.R92401

Opyt peredovykh rabochikh na podgotovitel'nykh i ochistnykh rabotakh.
Experience of leading workers in preparatory and cleaning work, by R. P. Kaplunov
i I. M. Panin. Moskva, Metallurgizdat, 1955.
112 P. diags., tables (Peredovyye metody truda)

KAPLUNOV, R.P., prof. doktor tekhn.nauk

Combined mining of Moscow Basin coal and iron ore deposits.

Nauch. trudy MGI no.18:97-112 '57.

(MIRA 11:9)

(Moscow Basin--Coal mines and mining)

(Moscow Basin--Iron mines and mining)

KAPLUNOV, R.P., prof., dekt.tekhn.nauk; KONCHEV, S.K., dots.; KOVALENKO,
A.N., inzh.

Secondary ore crushing with the use of thermit. Nauch. trudy MOI
no.18:113-126 '57. (MIRA 11:9)
(Mining engineering) (Thermit)

KAPLUNOV, R.P., prof., doktor tekhn.nauk.; MOSKAL'KOV, Ye.F., inzh.;
BREYTER, L.S., inzh.; DMITRIYEV, A.P., inzh.

Determining working motion parameters for a jet piercing machine
and type of its design for use as bore with thermal piercing.
Nauch. dokl. vys. shkoly; gor. delo no.3:209-218 '58. (MIRA 11:9)

1. Predstavlena kafedroy razrabotki rudnykh mestorozhdeniy
Moskovskogo gornogo instituta im. I.V. Stalina.
(Boring machinery)

SOV/118-58-11-4/19

AUTHORS: Kaplunov, R.P., Professor, Doctor of Technical Sciences and
Lyakhov, A.I., Engineer

TITLE: Experience in the Mechanization of Stoping in Thin Lodes
(Opyt mekhanizatsii ochistnoy vyyemki v malomoshchnykh
zhilakh)

PERIODICAL: Mekhanizatsiya trudoyemkikh i tyazhelykh rabot, 1958, Nr 11,
pp 16-18 (USSR)

ABSTRACT: A collective body at the Chair of Ore Deposit Exploitation
of the Moskovskiy gornyy institut im. I.V. Stalina (Moscow
Mining Institute imeni I.V. Stalin) recommended a multi-
purpose machine for the drilling of blast-holes, and the
transportation to be used in thin steep lodes. The machine,
of type BTA-3, consists of two basic parts: a) the winch
mounted on a crane, and b) the suspended platform from where
the drilling of blast-holes, the charging and the

Card 1/2

SOV/118-58-11-4/19

Experience in the Mechanization of Stopping in Thin Lodes

supporting of the stopping area are operated.
There are 2 diagrams, 1 photo and 1 table.

1. Ores--Production 2. Mining engineering---USSR 3. Drilling
machines--Performance 4. Industrial equipment--Operation

Card 2/2

KAPLUNOV, R.P., prof. doktor tekhn. nauk; ZHIGALOV, M.L., inzh.

Secondary crushing of ores by thermit briquettes. Elek. i tepl.
tiaga 3 no.4:26-28 Ap '59. (MIRA 12:7)

1. Moskovskiy gornyy institut.
(Ore dressing) (Thermit)

TERPIGOREV, A.M., akademik, nauchnyy red. toma [deceased]; KAPLUNOV, R.P.,
prof. doktor tekhn. nauk, nauchnyy red. toma; MOSKAL'KOV, Ye.F.,
gornyy inzh., red.; NEDIN, V.V., prof. doktor tekhn. nauk, red.;
SELEDKOV, Yu.V., gornyy inzh., red.; SOSEDOV, O.O., gornyy inzh.,
red.; TARASOV, B.Ya., gornyy inzh., otv. red.; PARTSEVSKIY, V.N.,
red. izd-va; TERIZRAEL'YAN, T.G., red. izd-va; PROZOROVSKAYA, V.L.,
tekhn. red.; KONDRAT'YEVA, M.A., tekhn. red.

[Mining handbook] Spravochnik po gornorudnomu delu. Red. kollegiya:
A.M.Terpigorev i dr. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po
gornomu delu. Vol.3. [Underground mining] Podzemnye raboty. Nauchn.
red. A.M.Terpigorev i R.P.Kaplunov. 1961. 803 p. (MIRA 14:8)
(Mining engineering)

KAPLUNOV, R. P.

PHASE I BOOK EXPLOITATION

SOV/5474

Terpigorev, A.M., Academician [deceased], Chairman of the Editorial Board, R. P. Kaplunov, Professor, Doctor of Technical Sciences, Deputy Chairman of the Editorial Board, Ye. F. Moskal'kov, Mining Engineer, V. V. Nedin, Professor, Doctor of Technical Sciences, Yu. V. Seledkov, Mining Engineer, O. O. Sosedov, Mining Engineer, and L. Ya. Tarasov, Mining Engineer.

Spravochnik po gornorudnomu delu. t. 2: Podzemnyye raboty (Ore-Mining Industry Handbook. v. 2: Underground Operations) Moscow, Gosgortekhzdat, 1961. 855 p. Errata slip inserted. 12,000 copies printed.

Scientific Eds. (Titlepage): A.M. Terpigorev, Academician, and R. P. Kaplunov, Professor, Doctor of Technical Sciences; Resp. Ed.; L. Ya. Tarasov; Eds. of Publishing House: M. M. Smirenskiy, and V. N. Partaevskiy; Tech. Ed.: V. L. Prozorovskaya, and M. A. Kondrat'yeva.

Card 1/18

Ore-Mining Industry (Cont.)

SOV/5474

PURPOSE: This handbook is intended for mining engineers and skilled personnel of the mining industry.

COVERAGE: Volume II of the handbook reviews various methods of underground mining and analyzes the basic principles underlying different types of ore mining operations. Parts I, VI, IX XI, and XV of this volume were written by L. Ya. Tarasov, Mining Engineer, L. Ye. Egel', Geological Engineer, also participated in writing Part I. Part II was written by A. M. Bybochkin, Candidate of Geological and Mining Sciences; Part III by D. N. Ogloblin, Professor, Doctor of Technical Sciences, and M. G. Papazov, Candidate of Technical Sciences; Parts IV, V, and X were written by R. P. Kapiunov, Professor, Doctor of Technical Sciences; Part VII by V. V. Nedin, Professor, Doctor of Technical Sciences, and by Sh. I. Ibrayev, Docent, Candidate of Technical Sciences; Part VIII by N. N. Polyakov, Docent, Candidate of Technical Sciences (deceased) and by M. B. Udalkin, Mining Engineer; Part IX by A. M. Alyamskiy, Docent, Candidate

Card 2/18